Postural reflexes

Reflex is the fastest and easiest way to allow the body to react immediately to a changed situation in a given time. One of the basic assumptions of an organism is that it can react adequately to its environment, perceive changes in its surroundings, process information as quickly as possible and immediately create a response. Reflex could also be called as a basic functional element of the nervous system, which is mediated through the reflex arc.

Upright standing can be controlled by several sections of the CNS:

- spinal chord;
- reticular formation (RF);
- midbrain;
- cerebellum;
- basal ganglia;
- cerebral cortex.

The basic element is the contraction of the antigravity musculature based on complex reflex actions using two basic types of reflexes - **postural** and **upright reflexes**.

Postural reflexes

The postural reflexes include:

- muscle tone;
- local static reactions;
- segmental static reactions;
- overall static reactions.

Muscle tone

Muscle tone is the **basic element for all postural actions**. It is provided by proprioceptive spinal reflexes. A supply of excitations from cutaneous exteroreceptors, the activity of spinal interneurons, the gamma system, and or reticular formation (RF) is required to maintain spinal motoneuron activity.

Local static reactions

Local static responses are the **simplest type of postural reflexes**. They are also (in other words) spinal exteroceptive reflexes, which are further classified as extensor reflexes. Extensor reflexes are those that elicit DK extension by applying pressure to the foot. They are called local because they elicit a response only in the muscle of the irritated limb.

Segmental static reactions

We also have segmental static, which controls the response for the **interaction of the muscles of multiple limbs**. The information coming from the proprioceptors is of major importance (e.g. the crossed extensor reflex, which is a combination of the flexor reflex ipsilaterally and the extensor reflex contralaterally).

Overall static reactions

Overall static responses are **superior to basic postural responses**. These reactions are responsible for muscle tone in the trunk as well as tone in the limbs. The spinal cord, RF and statokinetic sensor are mainly involved in their control.

The general static reflexes include:

- tonic neck reflexes
- tonic labyrinth reflexes
- phasic labyrinth reflexes

Tonic neck reflexes

Tonic neck reflexes are **initiated by irritation of proprioceptors in the neck muscles**. These are multisegmental spinal reflexes regulated by RF activity.

This reflex occurs in such a way that extension of the upper limbs occurs when the head is tilted, and extension of the lower limbs occurs when the head is tilted. When the head is turned, the extension of both limbs occurs equally.

Tonic labyrinth reflexes

The tonic labyrinth reflexes cooperate with the tonic neck reflexes either **directly** via the vestibular nuclei or **indirectly** via the descending RF facilitation system.

Phasic labyrintu reflexes

The phasic labyrinth reflexes perceive primarily the stimulation of the kinetic sensor (vestibular apparatus) by rotational movement of the head. They are important for maintaining an **upright posture** during complex and **rapid movements** (e.g. in sports) or are important for maintaining a **standing posture at rest**. They are controlled by the vestibular system, cerebellum, RF and ncl. ruber.

References

Related articles

- Reflex
- Upright reflexes

Used literature

- MYSLIVEČEK, Jaromír, et al. *Základy neurověd.* 2. edition. Praha : Triton, 2009. 390 pp. ISBN 978-80-7387-088-1.